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# Fight Borers by Land or by Air

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# Fight BORERS by LAND or by AIR

by Earle S. Raun and C. C. Blickenstaff

MANY IOWA farmers used some form of DDT to control "the borer" last season. There were some differences in the control measures used and in the results obtained.

Many fields were sprayed too late. For one reason or another some farmers just didn't get as good control as they had hoped for.

As part of the experimental work in corn borer control at Iowa State College last summer, we sprayed two fields from the air and one with ground equipment. We got good control when the spraying was done at the right time. Spraying in different swath widths by air made some difference in the control obtained.

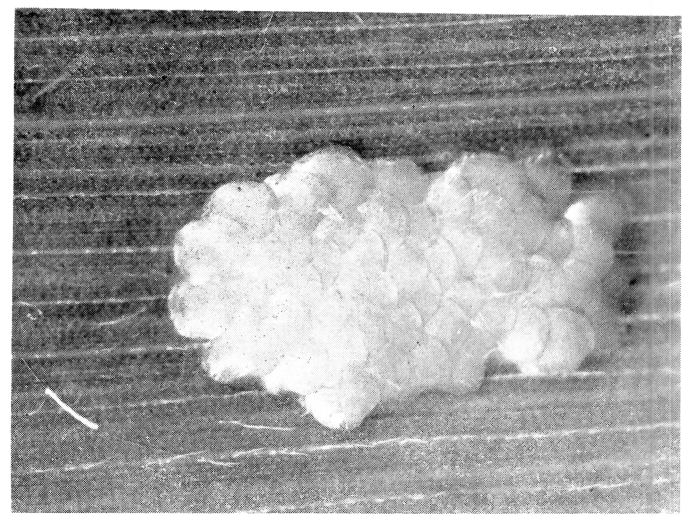
## Width of Swaths

A 50-acre field of early corn near Knoxville, Iowa, in the Des Moines River bottom, was sprayed from the air using different swath widths. Spray strips 40, 60 and 80 feet wide were staked out for the plane to follow in applying the DDT spray.

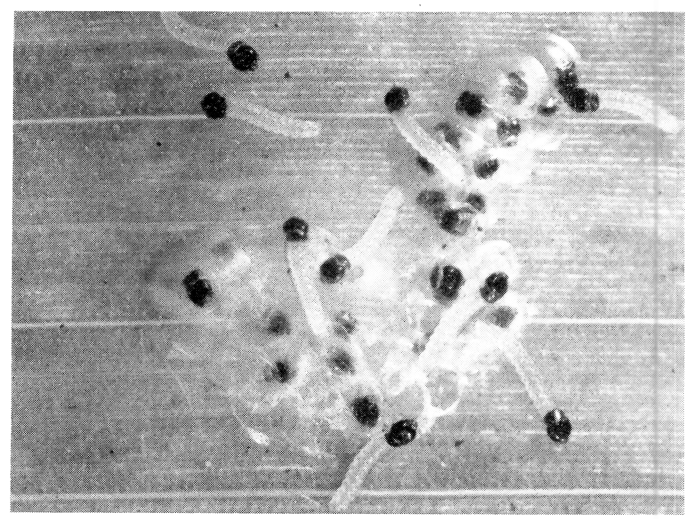
We sprayed this field first on June 14, when the egg mass count was 84 masses per 100 stalks. The corn was then about 42 inches high, measured to the tip of the extended leaf. On June 23 we sprayed the same swath strips a second time; the egg count then was 66 masses per 100 stalks.

A Stearman biplane was used for the job. It was equipped with a spray boom under the lower wing, extending from wingtip to wingtip and holding a battery of 30 spray nozzles. Spray was pumped out by a wind-driven centrifugal pump which delivered 40 pounds of pressure per square inch.

One pound of actual DDT in 2 gallons of spray (2 quarts of 25 percent DDT emulsion concen-



Here is freshly laid corn borer egg mass, glistening white. Masses may appear anywhere on the corn plant, but mostly on underside of leaves.



Some 7 to 10 days later the egg mass looks like this—young borers have just hatched, a few are still unhatched. Egg mass counts should be made daily. Timely treatment is important.

trate added to 1½ gallons of water) was applied per acre at each of the two sprayings.

Spraying was done in the late afternoon, about sunset, with the wind less than 2 miles per hour. The spray plane flew about 6 feet above the corn—with some variation due to the contour of the land.

## Results

On August 1 we examined this field for corn borer damage. In the unsprayed check strips we found 100 percent of the stalks infested. Results in the 40-, 60- and 80-foot strips were as follows:

| Swath width in feet | Percent of stalks infested |
|---|---|
| 40 | 36 |
| 60 | 54 |
| 80 | 78 |

Practical control was obtained by spraying a 40-foot spray swath. Then the degree of control dropped off rapidly as we sprayed wider strips. Further experiments will tell us more about the best spray width to use. But for a Stearman-type plane we recommend spraying in 46-foot strips. This is 14 corn rows wide.

## By Air—No. 2

A late field of corn was sprayed for second-brood borers at the Agricultural Engineering Research Farm 4 miles south of Ames. Here a Cub-type airplane was used, again with a spray boom running from wingtip to wingtip. And again we used a 25 percent DDT emulsion, applying 2 gallons of the mixed spray to the acre. In this case, however, the actual amount of DDT applied per acre was a pound and a half (3 quarts of emulsion added to 5 quarts of water). Swath widths of 49 feet were used. However, we found this too wide to give complete coverage with this type of equipment.

This particular field was planted late, June 9 and 10. One part of the field was sprayed on August 22, another on September 1, and a third plot on both dates. Infestation at the time of first spraying was 453 egg masses per 100 plants. This was at the peak of the egg laying period—a few eggs had hatched.

The difference in borer control obtained from the two treatments was considerable. The August 22 spraying gave 32 percent control. The September 1 spraying, made after most of the eggs had hatched, resulted in no corn borer control. And the addition of the second spray on the third plot increased borer control only slightly. The borer count per 100 plants on September 19 was 1400 in the untreated check plot; it was 1420 in the plot sprayed on September 1; 960 per 100 stalks in the plot sprayed August 22, and 710 in the plot sprayed on both August 11 and September 1.

Actual yields from the unsprayed check plot ran about 53 bushels per acre. The sprayed plots yielded from 4 to 10 bushels per acre higher than this.

**These experiments illustrate the great importance of spraying at the right time. Just 10 days made the difference between fair control and practically no control.**

In another field at the Agricultural Engineering Research Farm, we sprayed for second-brood corn borers using a high-clearance, 6-row, self-propelled ground sprayer equipped with fan-type nozzles. The egg count was 237 masses per 100 plants at the peak of the egg laying season.

In this test we sprayed 1½ pounds of DDT per acre in 8 gallons of spray using a 25 percent oil emulsion DDT.

Four plots were sprayed on August 21, near the peak of egg laying. Four other plots were sprayed on September 1 when most of the eggs had hatched.

Compared with unsprayed check strips, the earlier spraying gave us 59 percent control of borers, reduced stalk breakage by 45 percent, and increased yields by 10 percent (7 bushels per acre). The September 1 spraying gave much poorer results.

On September 17 borer counts were made in all plots. We found 436 borers per 100 stalks in the plots treated August 21. In the September 1 treatment there were 945 borers per 100 stalks. These

### Corn Borer Control Recommendations For 1949

1. Destroy corn residues that might harbor corn borers by clean plowing, use of stalk cutters, shredding, feeding, ensiling, etc. This will kill many borers.

2. Plant strong-stalked, strong-shanked, high yielding hybrids adapted to your community.

3. Use insecticides when necessary (determined by egg count).

4. **For first brood on early corn:** Treat corn when it is 35 inches or more in height (with leaves extended). Treat when egg mass count reaches 50 or more per 100 plants. If the egg mass count is still 50 or more per 100 plants, make a second application 7 to 10 days after the first.

5. **For second brood on late corn in August:** Treat only when the egg mass count reaches 100 per 100 plants. Only one treatment is necessary.

6. **Prompt timing is important!** Most late applications are a waste of money.

7. **What to use:** For sprays use 1 to 1½ pounds of actual DDT per acre. Use DDT emulsions when applying less than 10 gallons of spray per acre. Wettable powders may be used where 10 gallons or more spray is to be applied per acre. When using dusts, apply 1½ to 1¾ pounds of actual DDT per acre. Use 30 to 35 pounds of 5 percent DDT dust per acre.

compared with 1,055 borers per 100 stalks in the untreated check plots. The per-acre yields were 79 bushels (Aug. 21), 75 bushels (Sept. 1) and 72 bushels (not sprayed).

### Ground Versus Air

Both air-borne and ground spraying equipment have their good and weak points. Ground spraying is a little more reliable. You can spray in more kinds of weather. And you are a little more certain of getting a thorough coverage from the ground than from the air.

Air spraying is faster. It may be more convenient for out-of-the-way fields. Although spraying by air requires very calm conditions—wind less than 10 miles per hour—you can often spray by air when fields are too wet for ground equipment.

The type of plane used will make some difference in the width of spray strip that can be covered. Stearman-type planes have more horsepower and a larger wing area than Cub-type planes. The greater wing turbulence and propwash help to churn up the spray vapors and get good coverage in your corn. Such things, along with the weather, wind and lay of the land, affect the proper use of air equipment.

# Corn Borers on the March

**by Harold Gunderson**

DRIVING THROUGH the state this fall you wouldn't get the impression that the corn borer was putting Iowa out of the tall corn business. We've had two record crops in Iowa since the corn borer first appeared in 1942. Even though corn borers had spread through every county in the state by 1948, the damage wasn't crippling. The answer is that we've been able to control the borer fairly well.

Still, our experience in corn borer control is meager. We are seeking better control methods. We don't know exactly what the future holds in the battle against the borer.

Serious loss from the corn borer begins when fields become infested with about one borer per stalk. So the number of counties with this average population gives us some measure of the economic loss.

### First Borer in 1942

We had to look pretty hard to find the first corn borer in Iowa on August 10, 1942. But when we did, we soon found others in 20 counties along the Mississippi River. People were quite disturbed. Some had visions of disaster in Iowa's cornfields.

By 1943 one county had an average of about one borer per stalk. In 1944 there were two; in 1945, 7; in 1946, 19; and in 1947, 37. Finally this last season we had 72 counties in Iowa that averaged 1 borer or more per stalk.

We've been searching for new, better methods of control ever since the corn borer was first found. So let's review the situation. Let's see what we've learned in the last 6 years.

From 1942 to 1945 about the only thing we could recommend was to destroy all corn crop residues in which borers might overwinter. Ensiling, shredding or deep clean plowing was stressed. The theory was—the only good corn borer is a dead one.

This recommendation still stands where crop practices, soil types and rotations allow it. But it is not advised where destroying crop residues is contrary to sound cropping practices or where it interferes with erosion control.

We also recommend growing corn varieties which stand up under the attacks of the borer. Our local corn variety tests have shown this. Varieties that feature strong stalks and shanks as well as high yield may cut corn borer damage as much as 50 percent, even if you do nothing else to control the borer.

Research at the Iowa Agricultural Experiment Station has shown considerable differences in the ability of different varieties to hold up under the attacks of the corn borer. Researchers also have found that certain qualities in the corn plant may discourage the corn borer. Some day we may have corn varieties so distasteful to the corn borer that he won't even look at them.

### DDT Main Weapon

But today and for the immediate future, the main weapon against corn borers is still DDT. This is not a perfect insecticide by any means—it has its drawbacks. Under certain conditions DDT residues on corn may be dangerous if fed to dairy cows in production. Careless application of DDT in fields may injure fish and other wildlife in near-by streams, ponds and fence rows.

Although DDT does offer effective control for corn borers, the control measures have to be carefully applied. Proper timing of spray application is extremely important. You, the farmer, must be able to recognize corn borer eggs, to make egg counts, and to decide whether or not to treat. You must know what form of DDT to use, and how much to use per acre.

Last summer we found that our corn borer counts were not accurate unless fields were examined at least every other day. Each field had to be examined separately. The count in your own field and in your neighbor's field across the road may differ considerably. That's why you can't afford to leave the job of counting borers up to someone else. Each field needs close attention and careful counts if spraying is to be timed for best control.

It is not likely that we have seen our worst borer damage yet. We will need more and better controls. And each individual farmer must learn to know them, for he must make the final decisions of when and how to treat. Custom spray operators, county extension directors or neighbors may advise—but the loss or gain is yours.